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RESEARCH PAPER

Agroforestry Practices among Male and Female Farmers in South–South, Nigeria

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Abstract Perceptions of the benefits of agroforestry practices (AFPs) and the level of utilization of these practices by male and female participants were examined in the agroforestry programs of the Akwa Ibom and Cross River State Governments of the South–South region of Nigeria. Responses were derived from 250 randomly selected respondents. Overall, respondents perceived the major benefit of agroforestry practices as enhancement of environmental conservation. Female respondents however perceived increased income as the major benefit of agroforestry practices. A composite perception index revealed that women farmers were more favourably disposed than male respondents to the utilization of agroforestry practices. The farmers were favourably disposed to the utilization of only five of the 16 identified AFPs in the study area, including 'leaving of isolated woody trees on farmlands', 'utilizing woody trees as windbreaks' and to 'demarcate farm boundaries', 'planting of woody trees in combination with fruit trees', and 'planting of woody trees in combination with vegetable crops'. Male and female responses were generally similar although a major difference was observed with regard to 'planting of trees for fuel wood'. The composite index, however, revealed a general low level of utilization of AFPs, although female farmers were relatively more disposed to the utilization of AFPs. The key policy implication of the study is the necessity to embark on sustained education and environmental awareness campaign, with a focus on presenting AFPs as livelihood sustaining and risk mitigation activities, against its present misperception as simply a government strategy to increase the stock of woody trees in the environment. This policy should endeavour to target

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landless women farmers who have been found to be more interested in the adoption of AFPs into their farming system.

Keywords Agroforestry benefits · Agroforestry practitioners · Composite index technique · Akwa Ibom State · Cross River State

Introduction

It is generally believed that human wellbeing depends on ecosystem services such as those provided by forests (Mayers 2007). The International Centre for Research in Agroforestry specifically reported that about 1.2 billion people or 20% of the world's population depend to a large extent on forestry produce and services for their survival (ICRAF 2000). Ironically, large-scale deforestation has remained a major concern of developing nations in the humid tropics. In Nigeria, for example, Adedire (2004) estimated that about 400,000 ha of forest land is destroyed per year, in comparison with about 32,000 reforested.

The perceived importance of forest trees to human wellbeing has resulted in their being cultivated, in combination with crops or animals, i.e. agroforestry. Akinbile et al. (2007) described agroforestry as an aspect of farm forestry that encourages a deliberate integration of woody perennials with agricultural crops or animals on the same land management unit, with the aim of increasing income through the use of economic trees. It is pertinent to note that the act of combining trees, crops and animals is as old as humanity itself, according to The Holy Bible, in Genesis 2: 5–10, and it has been practiced since the middle ages in Europe Africa, Asia and tropical America (Udofia 2000).

Agroforestry is widely regarded as an important approach to reduce the problems of environmental deterioration and rural development (Foley and Barnard 1984). Leakey (2001) argued that agroforestry is now increasingly being seen as an alternative paradigm for rural development. According to Garrity (2004), this alternative paradigm addresses many of the global challenges, including deforestation, unsustainable cropping practices, loss of biodiversity, increased risk of climate change, as well as rising hunger, poverty and malnutrition, which have been highlighted by the United Nations Millennium Development Goals (MDGs). Agroforestry performs these roles through diversification of agro-production, amelioration of the micro-climate for increased crop production, reduction of heat stress in crops, maintenance of plant biodiversity, and weed control (Adedire 2005). Agroforestry also serves purposes relating to poverty and risk mitigation, livelihood sustenance, family food security and generation of additional income (Mayers 2006, 2007; Odurukwe 1989).

Akwa Ibom and Cross River States are mainly agrarian rural states in the humid tropical area of Nigeria's South–South (Niger Delta) region (Fig. 1). The two states face rapid deforestation and concomitant soil degradation. However, the governments of the two states have recognized the ameliorating role of agroforestry in environmental conservation, the necessity to increase the volume of woody stock, and the need to involve rural dwellers, especially those inhabiting the vicinity of

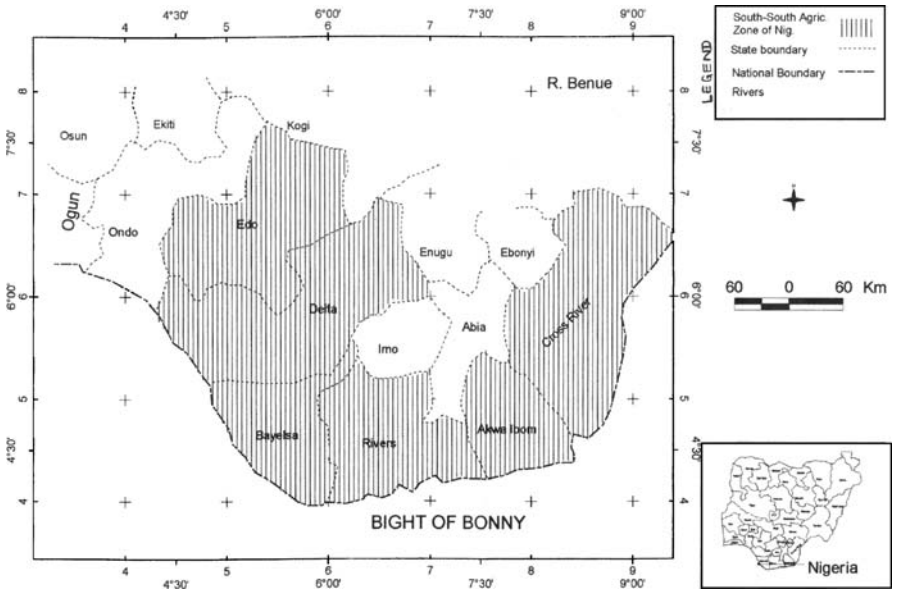

Fig. 1 Niger Delta region showing South–South Agricultural Zone of Nigeria. *Source*: GIS laboratory, UNIUYO

government forest reserves, in forest planting and conservation activities. Consequently, the state governments have embarked on agroforestry and taungya programs in selected areas. The governments have also embraced yearly National Tree Planting Campaigns in order to sensitise the population and especially urban dwellers and more literate individuals, to the importance of forest development and conservation.

Against this background, the level of preparedness of the state and its citizens to utilize agroforestry to meet the challenges of rural development may be assessed. This study reported here is part of a country-wide study undertaken by the Faculty of Agriculture of the University of Uyo, in conjunction with the Akwa Ibom Agricultural Development Project, to ascertain the level of utilization of introduced AFPs in the farming systems in the study area, with a view to recommending improvements in the extension delivery strategy of the two organizations. This particular phase of the study was designed to (1) ascertain the perceptions of agroforestry practitioners, with regard to the importance of agroforestry, as a natural resource management practice, and (2) to determining the level of utilization of the various agroforestry practices introduced to small-scale farmers in the study area.

Gender is an integral and inseparable part of livelihood (van Walsum 2000). With respect to Nigerian agriculture, Lahai et al. (2000) and Akpabio (2005) observed that gender differences exist in the division of labour for cropping and other farming tasks. In essence, any research activity must take into account different gender needs and targets, in the context of gender mainstreaming. According to Davids and van Driel (2002), this must take place not only at the abstract and national levels but also

within specific local contexts. Against this background, it was decided to disaggregate the responses of male and female respondents. It is believed that this will help to target extension offerings according to gender, so as to enhance the adoption and ultimate sustained utilization of agroforestry practices in the study area.

Research Method

The sample frame for the study comprised all the 951 small-scale farmers involved in the agroforestry program of the Forestry Directorate in Akwa Ibom State (411 farmers) and the Forestry Commission of Cross River State (540 farmers). According to the official gazette of the Federal Republic of Nigeria (2007), the general study area comprising these two states has a total population of 6.81 M, made up of 3.54 M males and 3.27 M females. The specific study area, comprising the 10 LGAs under survey, has a population of 1,427,846, made up of 749,685 males and 678,191 females. It may be pertinent to note that farming is a way of life in the study area; however, only interested farmers, mainly those seeking access to free land, participate in the program. Five Local Government Areas (LGAs) were purposefully selected in each of the two states based on numbers of participants involved in the program, according to official records. Simple random sampling was used to select 25 farmers from each of the 10 LGAs, a total sample size of 250 (Table 1).

A survey was conducted using a structured questionnaire, consisting of closed-ended evaluative questions framed to reflect the various forms of perceptions held on agroforestry practices, and preferences for common agroforestry practices. Development of the questionnaire was informed by a literature search to acquire insights on a world wide view about agroforestry issues, then focus group discussions (FGDs) to identify general perspectives of local people on agroforestry practices. Participants in the FGDs included various groups of agroforestry practitioners, active and semi-retired farmers, and serving and retired agriculture and forestry officials. In the survey, personal interviews were conducted with

Table 1 Allocation of sample members across states and LGAs

Akwa-Ibom State LGAs	Sample size		Cross River State (LGAs)	Sample size		Total number of respondents
	No. of males	No. of females		No. of males	No. of females	
Oruk-Anam	10	15	Akamkpa	10	15	50
Urue-Offong Oruko	10	15	Boki	10	15	50
Itu	10	15	Odukpani	10	15	50
Ikot-Abasi	10	15	Ikom	10	15	50
Esit Eket	10	15	Biase	10	15	50
Total	50	75		50	75	250

prominent farmers, local government officials and other informed community indigenes. Questionnaire administration was by enumerators drawn from the agricultural development programs in the study area. The enumerators took part in a one-day participatory training workshop for familiarization with questionnaire items. An important aspect of the training focused on how to rephrase the English items on the questionnaire to the native dialect of respondents.

Instrument validation was performed for Face and Content Validity, by experts in agroforestry and social research. For this purpose, all the three research fellows at the zonal office of the Forestry Research Institute of Nigeria (FRIN), and all the 15 lecturers of rank of senior lecturer to professor, in the departments of Forestry and Wildlife, and Agricultural Economics and Extension, in the three universities in the study area were drawn together in two brainstorming sessions. Instrument Reliability was ensured by a Test-Retest method, conducted on 20 agroforestry practitioners from each of Nsit Atai LGA (Akwa Ibom State) and Ugep LGA (Cross River State). The procedure involved exposing selected participants to the questionnaire items. This process was repeated after a one-month period on the same set of participants. Levels of similarities and differences in the latter and former documented responses of participants were determined with the aid of the Pearson product moments correlation statistic. A Reliability Coefficient of 0.84 was recorded and this was considered adequate in attesting to the reliability of the survey instrument.

Collated data were analysed with the aid of descriptive statistics (frequencies, means, ranks and composite indexes). The Composite Index (CI) analytical procedure was utilized to derive the proportional levels of perception (PAFP index) or utilization (UAFP index) of AFPs through the general relationship: $\sum X_i = X_1 + X_2 + X_3 + \cdots + X_n =$ PAFP or UAFP. Therefore the Composite Index is

$$CI = \sum X_i / M_s,$$

where n is the number of items; $X_1 \ldots X_n$ represent measures on the attribute scale (perception or utilisation); $\sum X_i =$ PAFP or UAFP represents the summative rating of level of perception or utilization of AFPs; and M_s is the maximum possible score of the scales of 'n' items. The composite index of PAFP and UAFP was computed for each of the 250 respondents.

To evaluate respondents' perceptions on the benefits (utility value) of AFPs, they were requested to provide positive or negative responses with regard to the perceived benefits of each of 26 outlined positive or negative items, reflecting various attitudinal dispositions. For positive items, a 'yes' response was given a weight of two points and a 'no', one point,, while the weighing pattern was reversed for negative items. This weighing pattern is consistent with social science research (Ogolo 1996; Akinbile 1999; Akpabio and Inyang 2007) whereby a positive response to a negative item is deemed to weigh lower than a negative response to a positive item. Total and mean perception scores were calculated for each attitudinal item, after which items with a mean score of 1.5 (mean of 1 + 2) and above, were regarded as Positive Attitudinal Disposition (PAD) while those with mean scores of below 1.5 were regarded as Negative Attitudinal Disposition (NAD).

The general status of respondents' attitudinal disposition (PAFP) on the benefits (utility value) of AFPs introduced in the area of study was determined with the aid of the Composite Index Technique which had three ranges, of (1) low (0.00–0.33); (2) average (0.34–0.66) and (3) high (0.67–1.00).

Respondents were requested to indicate their level of preference for the utilization of each of 16 outlined agroforestry practices. This was done with the aid of a 3-point Likert scale of 'not preferred' (score of 1), 'little preferred' ('2) and 'well preferred' (3). A mean cut-off score of 2.0 (mean of $1 + 2 + 3$) was utilized to distinguish between a Preferentially Utilized (PU) AFP (mean ≥ 2.0) and Not Preferentially Utilized (NPU) AFP (mean <2.0).

The general status of respondents' level of utilization of agroforestry practices (UAFP) introduced in the area of study was determined with the aid of a composite index with value ranges of (1) low (0.00–0.33), (2) moderate (0.34–0.66) and (3) high (0.67–1.00).

Results and Discussion

Perceived Benefits of Agroforestry Practices

Table 2 shows that in general, respondents believed that 12 of the 21 attitudinal items accurately reflect their perceptions of the utility value of agroforestry practices in their livelihood sustenance activities (especially agricultural production). The three most beneficial items were identified as 'enhancement of environmental conservation' (rank 1, mean 1.93), 'increased income or profit' (rank 2, mean 1.91) and 'production of raw materials for rural handicraft and cottage industries' (rank 3, mean 1.84). Interview sessions revealed that respondents perceived the broad notion of *environmental conservation* as encompassing all the visible and invisible advantages of AFPs (including diversification of agricultural production, reduction of heat stress in crops, maintenance of plant biodiversity, reduction of soil degradation, and other such advantages as are consistently mentioned by extension and research personnel. Males and females had generally similar perceptions, although male respondents generally recorded higher mean scores for the three highest ranked beneficial items. The attitudinal disposition of female respondents was found to differ slightly in that they perceived 'increased income' (mean = 1.89) as the most important benefit derivable from AFPs, while they also perceived 'provision of shade from extreme heat' and 'improvement in environmental aesthetics' as important benefits.

Both male and female respondents rejected the notion that AFPs confer no tangible benefit on agricultural production (Item 12), this being the only negatively phrased attitudinal item that was classed as false by respondents. There was however a general negative perception that the government was actually utilizing respondents to increase the stock of woody trees in the environment. This is because respondents were also expected to tend the woody plants established earlier by forestry officials and stood the risk of being ejected from their holding for the repeated destruction of woody seedlings. This perception is reflected in the almost

Table 2 Perceptions of benefits of agroforestry practices in South–South, Nigeria ($n = 250$)

No.	Perception[a]	Male gender (100)		Female gender (150)		Total (250)		Remarks[c]	
		Mean[b]	Rank	Mean	Rank	Mean	Rank		
1	Increases crop yields	1.66*	11	1.57	11	1.62	12	PAD	
2	Enhances environmental conservation	1.98*	1	1.88	2	1.93	1	PAD	
3	Increases income/profit	1.92*	2	1.89	1	1.91	2	PAD	
4	Enhances sustainable farmlands	1.70*	8	1.56	12	1.63	11	PAD	
5	Prevents soil degradation	1.82	5	1.83	3	1.83	4	PAD	
6	Produces raw materials for rural handicraft/cottage industries	1.92*	2	1.75	6	1.84	3	PAD	
7	Encourages crop diversification	1.80*	6	1.79	5	1.80	6	PAD	
8	Produces food for households	1.68	9	1.73	7	1.71	9	PAD	
9	Provides shades/improve aesthetics	1.68	9	1.83	3	1.76	7	PAD	
10	(−) Takes longer time to obtain profit	1.20*	19	1.11	21	1.16	20		NAD
11	(−) Too burdensome	1.26	17	1.33	14	1.30	17		NAD
12	(−) Does not give any tangible benefit	1.52	13	1.52	13	1.52	13	PAD	
13	(−) Trees occupy land meant for crop production	1.48*	14	1.23	19	1.36	14		NAD
14	(−) Requires large sum of money to practice	1.20	19	1.24	16	1.22	19		NAD
15	Produces plants of medicinal value	1.92*	2	1.69	10	1.81	5	PAD	
16	(−)Tree shade/leaves disturb crop growth	1.24	18	1.24	16	1.24	18		NAD
17	(−) Requires extra labour	1.30	16	1.33	14	1.32	15		NAD
18	Small land portion can be used to produce variety of crops	1.60	12	1.73	7	1.66	10	PAD	
19	(−) Cannot be practiced on leased land	1.12	21	1.12	20	1.12	21		NAD
20	It improves soil fertility	1.78*	7	1.72	9	1.75	8	PAD	
21	The practice is difficult to understand	1.34*	15	1.29	18	1.32	15		NAD

[a] (−) represents Negatively Phrased Attitudinal Items

[b] Asterisks signify that male respondents recorded higher mean perception scores than female respondents

[c] PAD = Positive Attitudinal Disposition, and NAD = Negative Attitudinal Disposition

wholesale acceptance by both the mixed and single-sex groups of respondents of all the other negatively phrased items as true reflections of their attitudinal disposition. It was however found that the male group did not fully conform to the notion that 'trees occupy available land, and hence reduce total crop production' (Item 13, mean 1.48). This may be attributed to the fact that land-ownership in the study area

is almost an exclusive preserve of the men, who invariably possess other land portions that could be utilized for other purposes. Women in most cases only access land holdings through the benevolence of their husbands.

Table 2 reveals that male respondents accrued higher mean scores (i.e. more readily agreed) to 11 of the 21 attitudinal items. It was however noted that of the seven items in which females recorded higher mean scores than males, three are negatively phrased items relating to extra burden and financial and labour constraints (Items 11, 14 and 17), while three others are those which are of benefit to the health of household members (Items 8, 9 and 18).

Finally, it is notable that the general perception across the male and female groups of respondents reflect the belief that the rudiments of AFPs may be difficult to understand (Item 21) and may not be conveniently practiced on leased land (Item 19). This assertion may be due to the perceived length of time required to reap benefits. The latter item was the lowest ranked attitudinal item, and was regarded as the most serious deterrent to the adoption of AFPs in the study area. It is important to understand that land ownership is the exclusive preserve of the males in Africa, because land is bequeathed and distributed to male children only, by parents. In the study area, women are the real farmers and not males, who are mainly absentee farmers. Women are therefore highly receptive to any program that will confer on them at least a pseudo-title to land (e.g. see Akpabio and Ekpe 2003; van Walsum 2000; Lahai et al. 2000; Akpabio 2000, 2005).

General Perception Index of Benefits of Utilization of Agroforestry Practices

Table 3 shows that 59.2% respondents had a moderate perception of the benefits derivable from the utilization of AFPs. On the other hand, 20.8% respondents were fully convinced of the benefits of AFPs, while 20% felt they could do without the use of AFPs in their agricultural production and other livelihood sustenance activities. These results are consistent with Egwali's (2000) finding in the same study area and are in conformity with Sadiat's (2002) conclusions with regard to southern Nigeria.

On a disaggregated basis, 50% males and 65.3% females recorded moderate perception levels on the benefits of AFPs. In essence, a relatively higher proportion of female respondents' felt that AFPs may be used to improve their agricultural livelihood sustaining activities. It was however observed that a higher percentage of

Table 3 Index of status of respondents' attitudinal disposition on the benefits of agroforestry practices in South–South, Nigeria ($n = 250$)[a]

Status	Interpretation	Male ($n = 100$)		Female ($n = 150$)		Total	
		F	P	F	P	F	P
000–0.33	Low	26	26.0	24	16.0	50	20.0
0.34–0.66	Average	50	50.0	98	65.3	148	59.2
0.67–1.00	High	24	24.0	28	18.7	52	20.8
Total		100	100.0	150	100.0	250	100.0

[a] F represents absolute frequency, and represents relative frequency

male than female respondents (24.0% as against 18.7%) had higher perceptions of the benefits of AFPs. This trend was repeated in respect of low-level perception for AFPs, with a recorded 26.0% for males and 16.0% for females. In other words, although a relatively higher percentage of male respondents had higher perceptions of the utility value of AFPs, female respondents were observed to possess relatively less negative perceptions on the utility value of AFPs. Female respondents also recorded higher moderate perception scores on the benefits of AFPs. On a general note, there is a strong prospect of AFPs becoming more popular and hence becoming more entrenched in the farming system of the study area.

Preferentially Utilized Agroforestry Practices

Table 4 reveals that farmers are favourably disposed to the utilization of only five of the sixteen (16) identified AFPs in their farming systems. These AFPs include: woody trees planted and left to grow (mean = 2.44, rank 1); planting of woody trees at boundaries of individual farm plots (mean = 2.2.6, rank 2); planting of woody trees in combination with fruit trees (mean = 2.19, rank 3); planting of vegetable crops in combination with woody trees at early stage of growth of woody

Table 4 Preferentially utilized agroforestry practices in South–South, Nigeria[a]

No.	Agroforestry practice	Males (n = 100)		Females (n = 150)		Total (n = 250)		Remarks	
		Mean	Rank	Mean	Rank	Mean	Rank		
1	Woody trees planted and left to grow	2.36	1	2.52	1	2.44	1	PU	
2	Combination of woody trees and vegetables at early planting phase	2.08	4	2.10	4	2.09	4	PU	
3	Trees at hedges/crops in between	1.52	8	1.53	11	1.52	8		NPU
4	Planting trees at farm/compound boundary	2.10	2	2.42	2	2.26	2	PU	
5	Trees/food crops/livestock raising combination	1.66	6	1.57	8	1.62	6		NPU
6	Planting woody trees for windbreak	2.02	5	2.03	6	2.04	5	PU	
7	Planting trees for fuelwood	0.94	15	2.07	5*	1.51	9		NPU
8	Trees/fodder on range land	1.20	14	1.47	12	1.34	14		NPU
9	Planting protein rich trees for fodder	1.14	16	1.29	16	1.21	16		NPU
10	Planting fodder on range land	1.30	12	1.55	9	1.43	11		NPU
11	Crops/trees/pasture/animals	1.28	13	1.40	15	1.34	14		NPU
12	Woody trees at hedges for browse/ mulch/ green manure/soil conservation	1.32	10	1.44	13	1.43	11		NPU
13	Trees/beekeeping	1.42	9	1.44	13	1.43	11		NPU
14	Trees lining fish ponds	1.56	7	1.54	10	1.55	7		NPU
15	Trees planted for fodder, soil protection and reclamation	1.32	10	1.61	7	1.47	10		NPU
16	Planting woody trees with fruit trees	2.10	2	2.27	3	2.19	3	PU	

[a] The asterisk signifies a major gender perceptual difference; PU means 'Preferentially utilised AFP'; and NPU refers to 'Non-preferentially utilized AFP'

trees (mean = 2.09, rank 4), and planting of woody trees to act as windbreaks or shade trees for buildings (mean = 2.03, rank 5).

On a disaggregated basis, male and female respondents revealed a generally similar disposition to the utilization of preferred AFPs. A major difference was however observed in respect of responses to item 7 (planting trees for fuel wood). Female respondents' regarded this item as a preferentially utilized AFP, while males did not see it as such. In essence, female respondents utilized 6 (of the 16) AFPs in their farming system, while males utilized only 5 AFPs. Table 4 also reveals that female respondents' generally allocated high affirmative responses to the five generally utilized AFPs. This may be attributed to their higher level of involvement in farming practices in the study area (Akpabio and Ekpe 2003; Akpabio 2000). Women have also been reported to be more actively engaged in experimenting with new ideas and practices on available farmland spaces (Offiong and Okon 2001; Akpabio 2005). Notably, full-time male farmers in the study area focus on the cultivation and tendering of economic trees including oil palm (*Elaeis guineensis*), rubber (*Havea braziliensis*) and coconuts (*Cocos nucifera*).

The act of 'planting woody trees' as implied by respondents, with reference to item 1, may not be a true reflection of activities in the specific study area and beyond. Farmers may not actually plant woody trees by choice. However, they do plant fruit trees and generally would not cut down mature naturally growing woody trees found on their farm plots, in the course of land preparation for crop cultivation. Such woody trees include oil palm (*Elaeis guineensis*), black pear (*Dacryodes edulis*), ukana (*Acioa barteri*), baobab (*Adansonia digitata*), African locust beans (*Parkia biglobosa*), and dry zone mahogany (*Khaya senegalensis*). It is however necessary to state that participants in the agroforestry program of the State Directorate of Forestry, who were included in the study, do plant woody trees, but not for their direct utilization. The activity of planting woody trees is the first major AFP that is introduced to agroforestry clientele. The land utilized for this activity is mainly government (forestry directorate) owned, and is allotted in plots to interested farmers. Plot allocation is predicated on the understanding that participants plant seedlings of woody trees (which are given out free to farmers) under the supervision of Forestry Officers. The farmers' thereafter have unfettered access to the allocated portions of farmland, on which they can now cultivate mainly arable crops, approved by the Forestry Directorate. Preferred crops may include egg plant (*Solanum melongena*) and vegetable crops (item 2, rank 4) including fluted pumpkin (*Telfairia occidentalis*), melon (*Cucumis melo*) and water leaf (*Talinum triangulare*). This farming system is of benefit to both the farmers (mainly females and the landless) who have free access to partially-developed plots of land for their farming operations. This is also of assistance to the Forestry Directorate, which can expand the area of forestry under its jurisdiction at little or no cost, in comparison to the hire of extra casual labour or recruitment of new staff. The farmers are also expected to secure the newly established woody trees from vandals.

The act of planting trees (either scattered or patterned) at farm and compound boundaries (item 4, rank 2) is an age-old AFP, which is mainly utilized on family-owned and communal land holdings, to demarcate such plots from landholdings of other families and communities. It is mainly done to secure such holdings from

encroachment, thereby preventing endless litigation that may arise from attempts to repossess such holdings. Trees planted at boundaries of homesteads and compounds serve additional purposes other than security of holdings. They may help to restrict homestead livestock (especially poultry, goats and sheep) from straying from adjacent properties and also protect them from harm or from engaging in destructive activities in nearby compounds. Trees may also help to ensure privacy by screening compounds from prying eyes. Prevalent trees and shrubs at boundaries of landholdings and compounds include: atama (*Heinsia crinata*), editan (*Lasienthera Africana*), ata (*Xylopia aethiopica*), nya (*Anthonata macrophylla*) and itumo (*Newbouldia laevis*). Others include ekpakpan (*Barteria nigritiana*) (which is useful for the construction of the major stakes and beams in the walls of local mud and thatched houses, odudu (*Lonchocarpus griffoneanus*), nkanika or pepper fruit (*Denettia tripetata*), bitter leaf (*Vernonia amygdaline*) and ndiya (*Cola pachycarpa*). Prominent exotic trees which are found mainly in peri-urban and urban areas include whistling pine (*Casuarina equisetifolia*), sand box tree (*Itura crepitans*) and Caribean pine (*Pinus caribaea*).

The act of planting woody trees, in combination with fruit trees (item 6, rank 3) is normally utilized at boundaries of individual landholdings, to act as live fences, as wind breaks and shades trees, and to provide access to fruit. Fruit trees also make up the highest proportion of forest trees in homestead gardens. Common examples in the locality include udara (ibibio) or African star apple (*Chrysophyllum albidum*); black pear-eben (ibibio) (*Dacryodes edulis*); mango (*Magnifera indica*), Indian almond (*Terminalia catapa*), guava (*Psidium guajava*), avocado pear (*Persa americana*) and oranges (*Citrus* spp). Maturing woody trees are generally left undisturbed on landholdings which are cleared in preparation for cultivation of crops. However, the women who are mainly responsible for household sustenance, in terms of food provision, may also tend woody trees, in anticipation of these later being utilized for fuelwood.

Status of Level of Utilization of Agroforestry Practices

As revealed in Table 5, a high proportion of respondents (67.2%) recorded low levels of utilization of AFPs introduced in the study area. On a disaggregated basis, a relatively higher proportion (70%) of male respondents recorded low levels of utilization of AFPs than female respondents (65.3%). In contrast, a relatively higher

Table 5 Index of level of utilization of agroforestry practices by farmers in South–South, Nigeria

Index range	Level of interpretation	Male ($n = 100$)		Female ($n = 150$)		Total ($n = 250$)	
		F	P	F	P	F	P
000–0.33	Low	70	70.0	98	65.3	168	67.2
0.34–0.66	Average	20	20.0	24	16.0	44	17.6
0.67–1.00	High	10	10.0	28	18.7	38	15.2
Total		100	100.0	150	100.0	250	100.0

proportion of female respondents recorded higher levels of utilization of AFPs than males (18.7% as against 10.0%). In essence, it may be inferred that there is a generally low level of utilization of agroforestry practices in the study area, although female farmers are more involved in the utilization of agroforestry practices in their farming systems than male farmers.

Conclusions and Policy Implications

Respondents perceived the three benefits of agroforestry practices (AFPs) as enhancement of environmental conservation, increased income, and production of raw materials for rural handicraft and cottage industries. Slight perceptual differences were however observed in the responses between gender groups. Female respondents perceived increased income as the most important benefit derived from agroforestry practices. They also included 'provision of shade from extreme heat' as an important benefit. Respondents generally rejected the notion that agroforestry practices do not confer any tangible benefit on agricultural production, but were in agreement with the reasoning that agroforestry practices cannot be conveniently practiced on leased land. They also accepted the notion that the components of agroforestry technology may be difficult to understand.

Farmers in the study area were found to utilize five AFPs in their farming system. The three major AFPs are 'woody trees, planted and left to grow', 'planting of woody trees at boundaries of farm plots', and 'planting of woody trees in combination with fruit trees'. Male and female responses were generally similar, except that female respondents also preferred to 'plant woody trees to be utilized as fuel wood' on their farm plots. In essence, female respondents utilized six AFPs on their farm plots while male farmers utilized only five AFPs. The composite index however reveals a generally low level of utilization of AFPs in the study area, although female respondents recorded relatively higher levels of utilization of AFPs than males.

Much still has to be done in order to popularize agroforestry practices so as to enhance their acceptability and ultimate entrenchment in the farming system of the study area. Some policy implications in this regard can be drawn from the study. Sustained education and environmental awareness campaigns by government and enlightened community leadership are necessary to enlighten the general public and the policy-makers, who are in general poorly informed about forest resource conservation practices and the consequences of deforestation. Advocacy effort may focus on the intangible benefits of forest conservation, including recreation and tourism potential, biodiversity conservation and soil nutrient and hydrological cycle conservation. Awareness campaigns for the local populace could be conducted, on a continuous basis, with a possible focus on churches, market places and the electronic media.

Policy-makers who allocate and disburse funds, are important targets for advocacy. A related discovery in the course of study is that apart from the recurrent annual minimal statutory allocation to the forestry directorate, funds are released only for the annual tree-planting campaigns, which are concentrated on only the

headquarter community of each local government area. No effort is ever made to decentralize the activity to remote parts of the LGAs where the full-time farmers who farm as a primary vocation reside. This is unlike fertilizer awareness campaigns, which are decentralized to remote areas of LGAs in the study area and which have resulted in widespread broad awareness and utilization of fertilizer packages. The ministries of agriculture and environment are expected to play a leading role in the future in ensuring that AFP awareness messages are broadly spread to the hinterland of rural areas.

The agroforestry program of the study area, as presently implemented, is perceived by the people as a government activity targeted at increasing the stock of woody trees in the region. It may be necessary for relevant government agencies to embark on advocacy efforts aimed at presenting agroforestry as a livelihood-sustaining and risk-mitigating activity. For that reason, improved varieties of indigenous tree crops and popular exotic fruit trees and economic tree crops including oil palm (*Elaeis guineensis)* may be introduced as components of the agroforestry program. Adopting a focus on economic trees, rather than the current wholesale focus on timber-yielding woody trees, would result in forest land being viewed as an economic entity where mature fruits from economic trees could be sold to generate income. This would hasten the acceptability and entrenchment of agroforestry into the farming system.

It may become necessary for the Forestry Directorate and state Forestry Commissions to focus on encouraging landless women farmers to participate in the agroforestry program. The majority of this group in the study area are committed full-time farmers, but farm on insecure rented or leased land portions. These women would be interested to participate in the agroforestry, which would provide an opportunity of having a pseudo-title to land, albeit for a limited period of time.

The response of women to the practice of agroforestry would be more pronounced if they had a clear title to land. In this respect, the large expanses of fallow forest land scattered over the state could be allotted to interested women farmers from adjoining communities and they could be motivated—through credit facilities, improved inputs and extension advice—to plant multi-purpose trees, in combination with arable crops. Sustainability of this proposed venture would be ensured if experienced forestry officers are posted to supervise operations at these sites.

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